

Gegenwart." It is clearly printed, has numerous illustrations, and the information, which is excellently arranged, is brought down to the latest date and is very full. The volume and the series are of a kind more numerous and popular in Germany than in England.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of rejected manuscripts. No notice is taken of anonymous communications.*]

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

The Prime Meridian Conference

In *La Nature* of November 22 (p. 399) appears what is represented as information obtained at the meeting of the Academy of Sciences at Paris on November 17. It is stated that the proposal made by Prof. Janssen at the Meridian Congress at Washington, relative to the application of the decimal system to the measurement of angles and time, obtained a majority of 24 votes against 21, notwithstanding the "opposition très-vive" of the English and Americans. The vote to which reference is made was not on the merits of Prof. Janssen's proposal, but merely whether the opinion of the President that the Congress was not competent to entertain it, should be upheld or not. The decision being in favour of considering it, the proposal was accepted unanimously. On turning to the *Comptes Rendus* of the Academy I find it simply stated that M. Janssen observed that his proposition had been accepted almost unanimously, and without a vote in opposition.

La Nature further refers to the British delegates as having made the discussion on the prime meridian a question of "amour-propre," and as having converted to the British cause most of the representatives present. This statement is no less inaccurate and misleading than the former. As M. Janssen himself remarked at Washington, England did not make the proposal to adopt the meridian of Greenwich, and though the British delegates differed from their French colleagues as to the considerations which should govern the choice of a prime meridian for longitude, there was not a word said by them to justify what is stated by *La Nature*, and it is manifestly absurd to speak of the conversion of the representatives to the British cause, inasmuch as it is a perfectly well-known fact that almost every one of them came to Washington with instructions from their own Governments to vote for the Greenwich meridian. In justice to M. Janssen I wish to add that the *Comptes Rendus* makes no reference whatever to anything having been said by him on this subject.

It is greatly to be regretted that a journal professing to be scientific should have given a colour to the discussions which took place at Washington that forcibly suggests a deliberate intention of exciting national jealousies and animosities.

RICHARD STRACHEY,

December 5

Late Delegate at Washington

IT is to be regretted that the French delegates have declined to accept some of the resolutions of the Prime Meridian Conference, but it is to be hoped that their non-adherence is only temporary; at the same time it must be admitted that their contention that Greenwich is not a scientific starting-point for a universal meridian has much to be said for it; the zero of longitude ought certainly to be defined somewhere on the equator, and if it were to be hereafter so defined at a point on the equator having the same meridian as the Greenwich instrument it is probable that all difficulty would be removed. The French are known to attach importance to ideas, and doubtless do not like the apparent supremacy which would be conferred

on Greenwich if it were made the actual centre of departure. The point in question lies somewhere in the Atlantic Ocean, and is therefore on perfectly neutral territory.

One of the great obstacles to the introduction of the French metrical system into this country lies in the forbidding and inconvenient nomenclature attached to it. If the long compound names were translated into short English monosyllables, such as *met*, *kim*, *mim*, &c., not only would their use be greatly advanced and facilitated, but the French nation would in time borrow back from us our nomenclature. Such words offend at first sight by their new and startling aspect, but this all wears off in an hour or two; they require however to be started by some one in authority. There is a strange and unreasonable prejudice in the present day against the introduction of new monosyllabic words without derivation, which happily for us did not prevail in the days of our early forefathers.

It is desirable that at future meetings of the Conference the question of astronomical nomenclature should be considered; the practice of using the same names for sidereal and mean time is extremely inconvenient. I have suggested that the sidereal hour should be called a *sid*, or *sider*, and the second a *cron*, so that sidereal time would be indicated by the letters *s*, *m*, and *c*. Some such change is greatly needed, and new names should also be assigned to minutes and seconds of arc.

London, December 1

LATIMER CLARK

The Electric Light for Lighthouses and Ships

THE application of the electric light to lighthouses and ships appears to me to be capable of considerable extension by a modification of the apparatus used. In lighthouses the practice is to have a fixed light in the lantern, with an apparatus either catoptric or dioptric, or a combination of both, for the purposes of bringing the rays of light from the arc into a parallel beam and sending them to the horizon. Sometimes, if not generally, this beam is cylindrical, and sweeps round at intervals of time as the combination of lenses and reflectors is rotated.

In the case of ships the head-light is an ordinary arc light, and searchers in use on men-of-war are arc lights set in the focus of a parabolic reflector, and pointed straight at the object it is wished to light up.

The arrangement that I would suggest as partly applicable to lighthouses and fully applicable to ships would be to use a fixed arc-light and large parabolic reflector in combination with a large, light, plane or suitably curved mirror to direct the beam of light, rendered parallel and cylindrical by the parabolic reflector, in any direction by means of this mirror only.

To apply this principle to a lighthouse, this light movable mirror would be placed in the lantern at an angle of something less than 45° with the vertical; the arc light and the fixed parabolic reflector would be placed below, centrally, in the tower; the light would then come from the parabolic reflector on the plane mirror, and so be sent in the required direction.

In using this mirror, where the light has to sweep over an angular area of less than 360° , I would use a to-and-fro motion, so that if the time of each sweep from side to side was 30 seconds of time, then any vessel in the middle line would have the light at this interval, but at any angular distance from the centre line the duration of the flashes would differ until, at the extreme range, two would be seen almost together, with almost 60 seconds interval between them and the next two, the sum of the time of two intervals always being the double of the fixed time for that light, and the difference between two intervals for all positions off the central line would enable the distance from the centre line to be determined by a vessel within the range of the light. An arrangement similar to this would answer for masthead lights for ships, the arc light and parabolic reflector being below deck, a light metal tube, terminating with a lantern to carry the plane mirror, going from the deck up to the required height in front of the forecastle; the movement in azimuth of this mirror might be of the same kind as that mentioned for the lighthouse, but a much quicker motion from side to side, through 180° in about five seconds, would then give this time for all points in a straight line ahead, but vary at the sides in the manner already mentioned. As the light plane mirror has only to be moved, a clockwork arrangement would answer perfectly well for this purpose. In rough weather, when the vessel rolled, the light would have a tendency to vary too much in the vertical direction, but it would not be difficult to make the correction by a gravity counterpoise.

For war-ships such an arrangement, but on a more powerful

scale, would answer for a searcher, and the motions could be given by simple mechanical means or by means of electromotors worked from any point. Here the chief working parts of the apparatus would be fully protected, and this would be of the first importance, and the rapidity with which the light could be directed to any point or rendered quite invisible would be a great improvement on the present model, where all has to be exposed.

For forts requiring powerful searchers, and it is easy to see that they might be of great use here, this arrangement is suitable, particularly as the mark, being stationary, is more likely to be struck than in a ship; but the replacing of the plane mirror would be easily effected, and other part of the apparatus of course being quite protected, as in the case of ships.

In the case of a fort in a channel that it was desired to protect, the beam of light from a powerful fixed parabolic reflector could be so truly sent that it could be reflected from mirrors at a distance, as on the banks of the channel, so as to sweep across close above the level of the water and show the smallest object crossing the illuminated line.

It may be objected that in this second reflection there will be a loss of light, but that loss can be made very small, and there would be positive gain in using a large parabolic mirror in place of the necessarily small and imperfect ones in use in a lantern of a lighthouse or the deck of a vessel. Such a parabolic mirror could be made accurately in sections of very thin glass silvered at the back so as to retain its reflecting powers for an indefinite time; in the case of a lighthouse it might be placed at any point vertically below the lantern, even at the bottom if the tower had a well as large as the intended beam of light. The large mirror above may be also of thin glass silvered in a similar way and with such a slight curvature as might be required to enlarge the beam in any way, and more than one of these mirrors might be used if it was necessary to have a fixed light in one constant direction or for any other purpose. I am not sure if there would be any gain in the power to penetrate fog. In the case of a head-light, there would be certainly, from the collection of light into a beam instead of the naked arc; but whether a light such as the very small point that forms the arc including the incandescent carbon ceases to affect the eye in fog sooner than the same intrinsic light seen as a surface must only be settled by experiment on a proper scale.

Ealing, December 5

A. AINSLIE COMMON

Natural Science in Schools

IN the interesting discussion which has recently been carried on in your pages on the teaching of natural science in schools, not much has been said about the text-books which are, or should be, read. So long as the present system of teaching a single branch of natural science continues, and until the method recommended by Prof. Armstrong is adopted, it is clear that great care should be exercised in the choice of a good text-book on the particular subject selected. Even when it is found possible to teach science in the form of physiography, or *Naturkunde*, there will doubtless be many boys in the large schools who, having thus obtained a great amount of most valuable general knowledge and a wider view of the aims of science than is possible under the present system, will wish to carry on their studies in a particular direction. Taking chemistry, as the subject with which I am most familiar, and which at present is perhaps more widely taught than any other branch of science, it may be said that there should be no difficulty at all in selecting a suitable book. It is true that the number of text-books of chemistry is extremely large, and it is also true that there are a few books, written by men of wide knowledge and long experience in teaching, which are well adapted to the purpose in view. But it is, unfortunately, equally true that there are many text-books which are either untrustworthy or are badly arranged, or which contain little more than a bare collection of dry facts, and it is to be feared that some of these not unfrequently find their way into schools. Doubtless most teachers of chemistry will agree with Prof. Armstrong that the educational value of a course of instruction dealing merely with the methods of preparation and the properties of a number of elements and compounds is extremely small, because the faculty of reasoning from observation is not thereby developed. It will also, I think, be generally admitted that "it is of great importance that the meaning of the terms 'equivalent,' 'atomic weight,' 'molecular weight,' should be thoroughly grasped at

an early stage." But it would perhaps be better that students should remain in complete ignorance of the meaning of these terms than that they should obtain such erroneous and illogical notions of atoms and molecules as are contained in some of the text-books. One of these books, which in 1880 had passed through no less than fifteen editions, and which appears therefore to be largely read, and which is advertised as being recommended by the head-masters of certain schools, contains the following remarkable statements:—

"Chemists assume that the elementary bodies are built up of infinitely small particles, which they call atoms; they further assume that these atoms, with few exceptions, are all of the same size. . . . The exceptions are phosphorus and arsenic, whose atoms are believed to be half the usual size; and zinc, cadmium, and mercury, whose atoms are double the size." (The italics are the author's.) To the uninitiated it might appear strange to argue about the relative sizes of infinitely small particles.

Again:—"All molecules are of the same size; for the law of Ampère, which most chemists now accept, states that 'all gases and vapours contain the same number of molecules within the same volume.'"

Most of the errors contained in these statements are of course due to a misapprehension of the meaning of Avogadro's (Ampère's) law. It is not very easy to give an average student a clear conception of the fundamental generalisations and theories by means of which chemists have been able to determine the most probable relative atomic weights of the elements. To do this, it is first of all necessary to induce the student to think and reason for himself, and it seems to be much easier for most people to repeat a thing from memory than to understand it. But when the student's memory has already been stocked with such illogical statements as those quoted above, the difficulty is very greatly enhanced.

SYDNEY YOUNG

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The Edible Bird's-Nest

THE nature of the material from which the edible bird's-nest is formed has been long the subject of controversy. It is very gratifying to find from Mr. Layard's letter, published in last week's NATURE (p. 82), that a reconciliation of the various views is possible. Most writers support the theory that the substance is secreted in some way by the bird, though they differ as to the manner. Sir E. Horne, in a paper published in the *Phil. Trans.*, 1817, suggests certain gastric glands as the active ones. Bernstein, forty years later, points to the prominence in the nest-building season of certain salivary glands which form cushions by the sides of the bird's tongue, and suggests that these secrete the material. On the other hand, there are advocates of the view that the nest is constructed of certain vegetable matter found by the birds in the caves where the nests are built, and agglutinated by them by a buccal or salivary secretion.

Through the kindness of Prof. Michael Foster I have been enabled to make some observations on the chemical nature of the material of the nests used for soup at the recent Health Exhibition, and from my experiments I have come to the conclusion that this is a substance resembling very closely the *mucin* described by Eichwald, Obolensky, and other writers, as forming the chief constituent of the mucous secretion of all animals and of the tissues of *Helix pomatia*, &c. It shows under the microscope scarcely any structure, but is laminated, shells splitting off easily in two directions. It contains here and there certain bodies resembling the cells of squamous epithelium. It is insoluble in either cold or warm water, but swells up in either, forming a gelatinous-looking mass; in both lime-water and baryta-water it is slowly dissolved, and the reactions of the solution differ very little from those described by the writers named as those of mucin. It resembles this body also in its behaviour when heated with acids, alkalies, and the different digestive ferment. The solution in lime-water contained a little debris, which proved to consist largely of pieces of feathers, with a little adherent amorphous matter. With the exception of certain microscopic particles among this, I could not get any evidence of the presence of vegetable matter in the nest substance. Indeed all the experiments I have described point certainly to the absence of anything but a glandular secretion.

Jos. R. GREEN
Physiological Laboratory, Cambridge, December 1